A Basis for Security Utilizing the Internet Protocol for Command and Telemetry
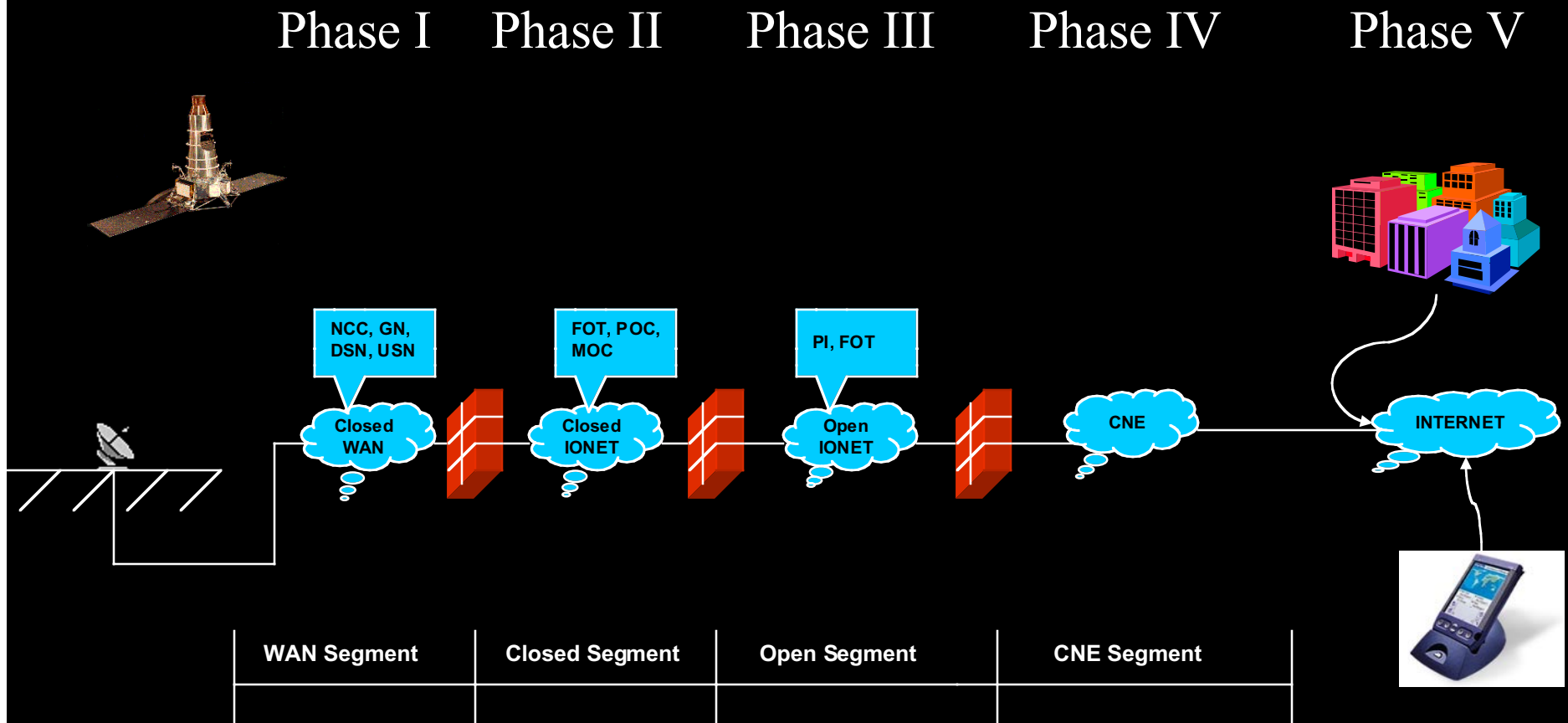
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Overview

- ***Objective*:** To define policies and or recommendations for procedures and configurations of hardware and software for the purposes of command and telemetry of spacecraft or instruments via IP and other internet protocols.

- ***Scope:*** All data whether uplink/downlink end-to-end is within scope. All hardware and software that is related to the ISO OSI model is also within scope with respect to security.

Sequence of Analysis

Phase I   Phase II   Phase III   Phase IV   Phase V

NCC, GN, DSN, USN

FOT, POC, MOC

PI, FOT

Closed WAN

Closed IONET

Open IONET

CNE

INTERNET

WAN Segment	Closed Segment	Open Segment	CNE Segment

Security Attributes

- **Non-Repudiation**
  - Encrypted signature using private key (verification of sender/receiver)
  - Biometrics
- **Access Control**
  - ACLs, TCP Wrappers, Host Allow/Deny
- **Authentication**
  - User ID, Password
- **Assured Usage**
  - Prevents denial service to the ground network, closed/open IONet
- **Data Integrity**
  - Checksum, Hash Tables
- **Confidentiality**
  - Encryption (e.g. AES, RSA, IPSEC, PPTP, SSL, SSH, etc.)
- **Traffic Profiling**
  - Prevents capture/replay, network traffic characteristics

Risk Analysis

- **Cost of Implementation**
- **Cost Impact**
  - **CPU Utilization**
  - **Delay Characteristics**
- **Feasibility of configuration**
- **Bandwidth Utilization**
- **Priority of Data**
- **Interoperability, Standardization**
- **Flight Software and Hardware Constraints**
- **NIST Approved Products (hardware/software)**

Deliverables

- *IP in Space Security Handbook* of regulations for all missions that choose to use IP for spacecraft communication. Compliance with handbook procedures is defined by class of mission.

- The team will validate vendors and appoint committees to authorize hardware and software that comply with proper security configuration. This validation is in accord with NIST(National Institute of Standards and Technology) regulations and procedures for security purposes.

FOR MORE INFO...

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